Metaphor, Sustainability, Transformation

Transdisciplinary Perspectives

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Chapter 1

Metaphor, transformation, and transdisciplinarity

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> Yes, metaphor. That's how this whole fabric of mental interconnections holds together. Metaphor is right at the bottom of being alive.
>
> Capra (1988: 79; quotation attributed to Gregory Bateson)

The language of transformation

This book is concerned with the ways in which language, metaphor in particular, but also myth, fable, parable, allegory, and other literary devices, can shape how we think about, and respond to, the environmental challenges that humanity is currently facing. It recognises that language makes sense of our world and shapes how we think and act: individually and collectively (Fløttum, 2014). Narratives – constructed stories – frame problems and issues in ways that are meaningful, creating an "architecture" for understanding the state of the world and what might be done to improve it (Jepson, 2018). Metaphor, myth, and fable influence how we frame problems and set agendas (Lakoff, 2004), affect whether or not we are motivated to act, and can play a role in bringing about needed transformations in deeply held beliefs, social norms, and institutions (Moser, 2006). These feed into narratives and discourses in ways which recursively and interdependently influence social, political, and economic institutions across a range of fields – psychological, philosophical, cultural, historical – thereby shaping the ways in which we engage with the natural world (Harré et al., 1999). This is why, for Bateson, metaphor was the "language of nature", the "logic upon which the entire living world is built" and the basis for establishing the "pattern which connects" (Capra, 1988: 84; Olds, 1992).

This is a book that is consequently interested in language but that has been written, largely, by people who do not regard themselves as linguists, rhetoricians, or cognitive scientists. On the contrary, we present ourselves – editors and contributors alike – as *transdisciplinarians* motivated by a shared interest in sustainability and concerned by the threats to the stability of Earth system processes. As environmental, social, and natural scientists, engineers, eco-humanity scholars, and with other academic influences, we have been engaged in a deliberative process of dialogue and discussion that has enabled us to reflect upon the role of language in shaping our understanding of current problems and possible

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solutions. We have come to appreciate – both individually and collectively – just how powerfully stories of, and about, the present lock us into styles of living, modes of behaviour, and patterns of thinking that can constrain our imaginations for the future. Consequently, we embarked upon a process of interrogating the role of metaphor, but also myth and fable, in shaping the ways in which we as individual academics think about our particular research "problem", but also how such devices might help or hinder in devising ways for transformative change.

Some chapters in this volume face this challenge head on, while in other instances, the approach is more circumspect, or even oblique. However, all share the same appreciation for the value and efficacy of the aforementioned language tools, not just for communication but in effecting transformational change. While many explore the historical underpinnings of language, again there is a shared recognition that humankind needs to mindfully employ these tools at the current point in our history to effect positive change, now more than ever. This is as a result of the significant challenges humanity faces, principally of our own doing. These challenges may be collectively termed as challenges of (un)sustainability; for while we appear to be flourishing on many levels, such as with respect to technological prowess or global population or connectivity, the flip side reveals systems at, or heading towards collapse. This is supported by current evidence of the interconnected crises in the areas of biodiversity loss, depletion of freshwater stocks, climate breakdown, and across the fields of food, energy, health, and well-being. Of these challenges, climate breakdown has generally stood out as the most pressing, though the COVID-19 pandemic has highlighted the precarious nature of many of our globalised human systems (while the likelihood of such pandemics appears now to have been significantly enhanced by increased human encroachment on the natural world). This book consequently includes contributions from authors representing a variety of disciplinary backgrounds engaged in research across a range of domains where sustainability has come sharply into view. These stretch from the global food and energy systems, through reflections on what we mean by healthy human development to our very existence in the world and the meanings we ascribe to our experience. While the book's focus is primarily on metaphor, it also contains contributions on myth and fable, as constructs that similarly condition our thoughts and actions, and indeed how these may be directed into narrative and discourse, in precipitating required transformative change.

This volume is based on the conviction that in such a fundamental rethinking, we need to pay attention to the language we use in framing both the problems we face and the solutions we devise. It is based on a belief that the metaphors we currently use can lead us to act inappropriately and that an active reimagining of our language is needed. Which metaphors will we need to address the deep era of transformation we are currently navigating? What myths might we need to overcome? What fables could act as a signpost to the direction we need to be travelling? This book, in its transdisciplinary exploration of metaphor, myth, and fable, and its inclusion of authors from across a diverse range of disciplines, aims both to highlight the critical role of language in bringing about the transformations required for sustainability, and to act as a source of ideas for others aiming to change how we think and act in pursuit of those transformations.

Given the importance of metaphor in helping us to make sense of the natural world, and recognising that some readers of this volume will be less familiar with the roles performed by language and literary devices in framing our understanding, we have sought to provide a simple explanation in the following section. Those already familiar with the work of George Lakoff and especially of Brendon Larson (Larson, 2011) may choose to pass quickly over this and head for the following section 'Metaphor and structure of the volume', which explores the significance of transformation. This is a word – much like sustainability – prone to misuse where claims for its operability disguise or conceal interests seeking to maintain business as usual or incremental improvements in efficiency. For us, transformative change cannot rest on supply-side solutions without also interrogating the nature of demand: how it is constituted, by whom and at what cost – socially and ecologically? This is followed by an overview of the rest of the book which is structured into four parts, with the rationale for this explained, together with a short summary of each chapter.

The importance of metaphor

Aristotle's Poetics provides a classic definition of metaphor as the thing that gives a name to something else (Kuusi et al., 2016). Metaphor enables us to understand one thing in terms of another, and to think of an abstraction in terms of something more concrete. So, far from being superfluous, metaphors have profound purpose. We rely on metaphors to understand the world around us, to think, and to communicate. Recent scholarship in the field of cognitive linguistics shows that not only are metaphors essential to human thought and communication, but that they have intense influences on how we conceptualise and act with respect to important societal issues. Indeed, as Byrne describes in Chapter 6, some propose that metaphors actually frame the very basis of human understanding of the world around us (through the right hemisphere of the brain) which in turn is translated (in the left hemisphere) into words and language (McGilchrist, 2009).

According to Ison, Allan, and Collins,

> Humans understand and relate to the world around them with the help of frameworks that mediate what is observed, what it means and what is considered as wise action… they are developed and maintained via discourse, and in particular, spoken and written language … While all language is important, metaphor has been shown to be disproportionately influential in developing and reinforcing frames…
>
> (Ison, Allan and Collins, 2015, pp. 1699–1700)

Metaphors can define a problem, delineate the scope of analysis, and suggest hypotheses for testing theoretical propositions (Marks, 2011). In academic enquiry, metaphors have been described as "one of the deepest and most persistent phenomena of theory building and thinking" (Paprotte and Dirven, 1985). Exposure to different metaphors has also been shown to induce substantial differences in opinion about how to solve social problems, while demonstrating that the power of framing by metaphor is covert (Thibodeu and Boroditsky, 2011).

By way of example, they show how metaphorical framings of urban crime as respectively an attack by a virus or by a beast elicits contrasting responses along a spectrum from social reforms to catching and caging.

Discourse metaphors are a particular type of metaphor that draw upon and reflect the cultural and social preoccupations of their time. According to Zinken et al. (2008), discourse metaphors employ cultural knowledge and function as key framing devices within a particular discourse. They function both to express a particular understanding of an issue, as well as evoking an emotive response. Once established, they can frame public discourse and policy responses. In this way, discourse metaphors extend beyond individual cognition and influence both public policy and society.

Atanasova and Koteyko (2017) provide the examples of war and religion as dominant sources of discourse metaphors in the ongoing debate around climate change. In their analysis of opinion pieces and op-eds, published between 2006 and 2013, they contrast how "Guardian Online" predominantly used war metaphors to advance pro-climate change arguments, while "Mail Online" primarily used religion metaphors to advance climate-sceptic arguments.

War metaphors were present in around 44% of all Guardian Online editorials and op-eds that contained metaphors. These metaphors spoke of "fight", "retreat", and "the battle" to prevent climate change. These war metaphors were used to evoke images of collective effort, to instil a sense of unity and patriotism, and to appeal to shared goals and collective action.

Religion metaphors appeared in over 78% of all "Mail Online" editorials and op-eds that contained metaphors over the period to advance anti-climate change arguments. Climate change activists were depicted as "zealous fanatics", "medieval preachers", proclaiming that the end of the word is nigh, while climate change was described as "a creed", "a faith", a subject that went beyond the rational. Climate sceptics were depicted as being treated like "heretics", and the science behind climate change was likened to a religious text that cannot be questioned, and thus not "real science".

As discourse metaphors, these metaphors of war and religion draw upon a reservoir of cultural myths and social representations readily available in social memory, namely memories of past wars and religious conflicts. In doing so, they implicitly evoke past memories as a potential guide for current action. For example, military thinking, according to Annas (1995), "concentrates on the physical, sees control as central, and encourages the expenditure of massive resources to achieve dominance", and so suggests particular kinds of responses. However, as Mullally reminds us, context matters as his analysis of climate narratives in Irish print media revealed (Mullally, 2017). Here, war metaphors were deployed to a very limited extent while religious metaphors were invoked by discourse coalitions for climate action as well as by much less prominent climate sceptics.

Given the ubiquity of metaphors and the profound role they play in problem solving, provoking new understandings (Brown, 1976), and providing tools for effective communication, this book serves as an entry point to explore the potential uses of metaphor, and their different cultural forms, e.g. myth, fable, parable, etc. in furthering research into, understanding of, and communication on the transformative changes necessary for the transition to a more sustainable society.

Properties of metaphors

Metaphors draw on our physicality

As Lakoff and Johnson (1980) pointed out in *Metaphors We Live By*, we interact and interpret the world as embodied human beings and we use this basic fact of our embodiment in the world to make sense of new phenomena and to communicate with one another. To provide just one example, metaphors that draw on our physicality include those of balance, which we apply to balance of nature, well-balanced personality (as opposed to being imbalanced), balancing the books, and tipping the balance.

Metaphors are embedded in shared cultural contexts

Metaphors are not merely shorthand for facts. As Larson (2011) points out, scientific metaphors embed facts within webs of social, moral, political discourses, and webs of meaning. The selfish gene metaphor (Dawkins, 1976) provides one example of how scientific metaphors can communicate particular values, as can that of survival of the fittest (Spencer, 1864). Scientists, and other academics, consciously and subconsciously draw upon culture for metaphors with which to describe and communicate their work.

Metaphors influence our social reality and our perception of the natural world

Metaphors are part of the frames or cognitive structures that organise ideas. In *Metaphors We Live By*, we are told that much of cultural change results from the introduction of new metaphorical concepts and the loss of old ones (Lakoff and Johnson, 1980). In the preface to *Don't Think Like an Elephant*, Lakoff comments that: "our frames shape our social policies and the institutions we form to carry on our policies. To change our frames is to change all of this. Reframing is social change" (Lakoff, 2004: xv).

Of particular importance are so called feedback metaphors. According to Larson (2011), feedback metaphors are metaphors that harbour social values and circulate back into society to bolster those very values. They have been widely adopted and structure thought and action along one particular line rather than another. They resonate with widely held cultural values and form part of the cultural meta-narrative. A feedback metaphor has become naturalised so that we forget that it is a metaphor and we live according to it.

Two examples of feedback metaphors which Larson examines in detail are the metaphors of progress and competition. Progress and competition are powerful ideological metaphors that justify how we act in relation to each other and to the natural world. These metaphors reinforce status quo values of progressive idealism and competitive capitalism, rather than alternative values of sufficiency, co-operation, and interconnection. Feedback metaphors can become naturalised, eventually becoming entrenched as natural and true.

Metaphors can suggest specific modes of action

Larson (2011) again points to two prominent metaphors that environmentalists have adopted to illustrate how metaphors can suggest particular courses of action. Gaia, derived from the name of the Greek Earth goddess, is used to envision the earth as a living organism, with self-regulatory capacity and stability over enormous periods of time. The other, Spaceship Earth, conjures up a quite different image of our planet as a finite system hurtling through endless space, encouraging us to better manage its resources. Gaia suggests we need do nothing (or at least minimise unnecessary intervention) as mother earth can look after herself. Spaceship Earth, on the other hand, suggests that it might be better to leave environmental decisions to expert technocrats.

Metaphors can enhance or inhibit effective communication

Metaphors can play a number of roles in communication, namely in transferring knowledge, enhancing open dialogue, and prompting action.

(i) The role of metaphor in transferring knowledge: Traditionally, scientists have understood the purpose of their communication to be remedying the public's knowledge deficit. Metaphoric resonance provides a revised view of science communication. Metaphors communicate not only facts, but a web of facts and values, and resonate within a particular framing. If a metaphor does not resonate within the frame of the listener, communication will be ineffective, no matter how compelling the factual case may be.
(ii) The role of metaphor in enhancing open dialogue: Metaphors can prompt dialogue between people with different perspectives. No single metaphor can capture a phenomenon in its entirety because every metaphor highlights certain elements while backgrounding others. Using diverse metaphors to introduce differing perspectives can allow opposing views and different ways of viewing a problem to remain in dialogue. Multiple opposing metaphors may also be necessary to grasp the complexity of reality. The psychologist William James, for example, promoted the benefits of holding diverse metaphors in mind, an ensemble of metaphors to characterise human psychology (see Kress, 2000).
(iii) Role of metaphor in prompting action: One of the key aims of communication in sustainability is to prompt governments and citizens to take action to avoid further environmental and social damage arising from unsustainable practices. A wide range of metaphors are being used to evoke emotional responses in the hope of motivating action. One issue of particular importance in regard to climate change is the use of metaphors of impending catastrophe. It is a matter of some debate as to whether such metaphors are effective in promoting change, or whether non-threatening and positive imagery (e.g. Ehrenfeld's sustainability-as-flourishing (Ehrenfeld, 2008)) may be more effective in motivating genuine change.

As Schön (1979, p. 255) has written, "The essential difficulties in social policy have more to do with problem setting than with problem solving, more to do with

ways in which we frame the purposes to be achieved than with the selection of optimal means for achieving them". It is important that metaphors provide the new frames as well as contribute solutions within existing frames. If our current crises are partly crises of thinking, and thus of language and metaphor, one of the solutions is also to be found in new metaphors and with the stories they might help to construct.

Minding our language

Larson's (2011) injunction to *mind* our metaphors operates on a number of different levels. On a cognitive level, metaphors act as a framing device or a conduit for communicating meaning. On a normative level to *mind* connotes a responsibility for care, or *care of* something. Taken together Larson refers to these colloquially as *metaphoric resonances* and the "connections that this creates among different cultural realms as a *metaphoric web"* (Larson, 2011: 12 [emphasis in original]). Metaphors frame communication by selecting specific associations between language and experience (Castells, 2009). As such, the conative or emotional level (Norgaard, 2011), as in to *mind* as to love or *care for* or care about as articulated in *Laudito Si, Caring for Our Common Home* also needs to be foregrounded (see Chapters by Hughes, Byrne, Sheehan this volume). The value of a metaphor also therefore resides "… in its placing in a web of new complex relations, through which it is brought into a new light, receives peculiar emotional values and is comprehended more vividly and completely than before" (Rickards, 2015: 281).

Consequently, we require new memes to facilitate cultural evolution and language can play a critical role as a form of social disturbance. A language that is environmentally adequate should enable us to talk about environmental matters in an informed manner and promote the well-being of humans and the environment. Yet the language we use is shaped by the society in which we live, while at the same time that that society is shaped by the language that is used: a dilemma likened to fish reflecting on water in which they have lived all their lives. Yet the purpose of seeking novel language constructs is neither to reject entirely the ones we have nor to provide a single alternative. Instead, new forms of language reveal limitations with the dominant view and thereby point to elements of more creative thinking: they enrich our perception and can break the grip of entrenched thinking.

Metaphor, then, reminds us of the fundamental interconnection between things. This extends across dualities of fact-value, science-society, literal-figurative. With metaphor we see one thing in terms of another and the key question is whether they enhance our sense of interconnection, and in what way. We want language to connect us to one another, and to connect us to the world. As this book will explore, it is perhaps on metaphors, myths, and fables that embody subjective and empathic relations, rather than mechanistic values, that a new and enduring ethic can be built.

This book aims to encourage the development and adoption of language that will be more conducive to the conceptual shift we require for sustainability. We will require more novel, poetic images that help us see the limits of ordinary

language; ones that express the depths of our fears and sorrows, and the loftiness and possibility of our hopes and dreams. We require images that are hopeful as well as catastrophic, that bring us closer to the world rather than separating us from it. We require language that reforms human relations and that harnesses hope rather than fear. It is in this spirit that the book is compiled; the chapters do not aim to provide the definitive word or coherent structure ("a tamed beast") on metaphor for transformation; rather they seek to facilitate and embrace a range of approaches and perspectives, emanating from a diverse range of disciplinary fields to provide some playful explorations and enticing glimpses of, at the very least, a less unsustainable future.

In the spirit of Brendon Larson (2011), then, this book poses the question: "If our metaphors do not encourage us to maintain a world in which we can live, what is the point of understanding?"

Metaphor and structure of the volume

We have organised this volume into four parts: Metaphors of Reason; Myths and Metaphors of Unreason; Metaphor, Myth and Mind; and Metaphors of Creativity and Practice. Further on, we summarise the key arguments of each chapter but here provide a brief explanation of the metaphors (and myths and fables) that are drawn upon.

The first section of the book, then, focusses on metaphors of science, technology, and reason and examines the metaphors that are used to describe technological change. Do such metaphors really reflect the complex technological and social processes involved? Do they minimise the potentially destructive unintended consequences that new technologies often bring? Climate change is the most obvious of such unintended consequences, but this section also looks at both positive and negative consequences of technology in the global agriculture and food systems. The metaphors of planetary boundaries and metabolic rift are explored as images that can aid our understanding of the remarkable advances and the daunting problems that agricultural science and technology have created. Metaphors of food also influence how we view ourselves as individuals and as societies. This section also charts how food metaphors are evolving in step with technology, often in a direction that points to the replacement of "bothersome" food with supplements and nutrients that will enable us to transcend the limitations of our energy hungry bodies. Or alternatively, how can metaphors develop a narrative capable of portraying food as being more than mechanistic building blocks required to fuel the body and support physical growth and, in transcending this purely functional role, convey its enormous potential as the basis for social cohesion at a number of levels (family, community, regional culture, etc.). How are metaphors enabling or resisting this transition to a cyborg future? Finally, the section returns to the challenge of climate change and explores how the simple metaphor of carbon budgeting is helping individuals and governments grapple with the fundamental problems of equity and responsibility in the context of our continuing carbon prolificacy.

The second section in the book, Myths and Metaphors of Unreason, aims to widen the scope of debate on sustainability by challenging the primacy of purely scientific, technological, and reason-based approaches. It opens by exploring the famous metaphor of Yin and Yang, or complementary duality, as an invitation, not to reject scientific reasoning, but rather to complement rational thought with holistic, symbolic, "right brain" thinking. This section also argues that sense making in terms of myth and fable has been marginalised, with Goethe's Faust (who sold his soul in return for knowledge) being perhaps the sole remaining myth of modernity. It explores the work of neuropsychiatrist Ian McGilchrist who asserts that while science and reason are primarily left-brain functions, the right hemisphere of the brain thinks more integratively in terms of metaphor, myth, and fable. This section too argues for the urgent necessity for the restoration of myth as a tool for sense making in order to provide direction amid the radical uncertainty of unsustainability. It concludes by exploring the seemingly unreasonable proposition that society should proceed slowly (though wisely) in charting the future course towards sustainability. This proposition, seemingly unreasonable because of the urgency of climate change and environmental and species destruction, is explored in a sequence of variations of the fable of the Hare and the Tortoise. When it comes to the challenges of sustainability, could "slow and steady", paradoxically, really win the race?

The next section, Metaphor, Myth and Mind, explores metaphors and myths from psychology, psychoanalysis, illness, mental health, and dreams. It asks how metaphors of mind can help to reframe the challenges we face in overcoming unsustainability and the mindsets that underpin it. It looks at the myths of Narcissus and Oedipus and suggests that, as a collective, humanity has still to overcome some of the most fundamental challenges of early human development, namely the development of capacities for altruism and concern. The section also broadens our attention, again, away from environmental concerns to explore metaphors of illness and the challenge of dementia. Metaphors of decline and decay, of war, flood and epidemics are common in discourses about dementia. The section argues that such metaphors increase suffering and calls for new and more imaginative metaphors as being an integral part of our human response to the illness. Finally, the section returns to an earlier theme of the book, that a fundamental reorientation of our current dominant view of reality is integral to the transition to sustainability. It explores the Shamanic dream, a cultural practice that spans from Siberia to the Amazon, as a means of gaining insight into the radically different worldviews of some indigenous cultures. It argues that the shamanic dream provides metaphoric insight into humanity's deep interconnection with and responsibilities towards our ancestors, our environment, and our future.

The final section in the book, Metaphors of Creativity and Practice, turns to literature and creative practice and the metaphors that suffuse these domains. The section examines the thoughts and writings of Irish writers James Joyce and Mike McCormack. It explores how the metaphors of "portal" and "diffraction" were used by these authors as devices in their work to change how we, as readers, experience the world. Echoing the earlier metaphor of agonistic dualism, these writers use techniques of ambivalence, over-determination, free association, and

antitheses left unresolved, as means to disturb narrative and thought, and, in doing so, open up space for new imaginative possibilities. The metaphor of the portal, as a space which transforms us as we pass through, was one which deeply infused Joyce's work and reflected Joyce's intention that Ulysses and Finnegan's Wake be transformative works. McCormack's writing similarly seeks to bring about a fundamental change in worldview, through literature that does not simply reflect reality by mirroring experience, but rather by diffracting and breaking up reality, making it multiple and discontinuous, thereby enabling a renewal of experience. The section closes by further illustrating how creative writing, dance, theatre, music, film, and visual art practices are knowledges which challenge the hegemony of critical analytical modes of meaning-production. It closes with the metaphor of the "Rain Box", a box within which it is always raining, as an image of a place within which stories are dissolved, stories suffused with meanings and metaphors – meanings and metaphors that hold the potential to lead us towards a brighter and more sustainable future.

Transformation: The role of language

This section will discuss the meaning of transformation and explain why it represents such a vital issue for our era. For if we are to fully comprehend the scale, complexity, and deeply interconnected nature of the global environmental crisis that we face then, inevitably, it also reveals the profound shortcomings of prevailing operating procedures through which this crisis is currently being addressed. Such procedures most often originate in the realm of governance where an array of economic instruments, including taxes and incentives, and regulatory measures covering environmental standards, are accompanied by a range of modest social policy initiatives seeking to "nudge" the behaviour of citizens. Yet, wherever we look, we see governments largely incapable of engaging with the scale of the problems faced and all appear to be beholden to the pursuit of economic growth, seemingly irrespective of its social and environmental consequences. We return to the matter of growth below. Policy must, of course, be informed by scientific evidence; but the nature of the environmental problems with which we now grapple have presented a profound challenge to the scientific community and its traditions. While a rear guard defence of positivist methods girded by a corresponding "techno-optimistic reductionist scientism" (Barry, 2017) has informed a broader scientific scepticism, others have worked tirelessly to develop a new ontology capable of embracing notions of complexity, uncertainty, and non-linearity, as well as to appreciate that facts and values are less clearly demarcated. Labels such as Mode 2, post-normal, and triple-helix approaches alert us to new ways of conducting research involving complex system analysis that recognises the dynamic nature of coupled social-ecological systems where values and judgements shape human action with real-world consequences (Funtowicz and Ravetz, 1993; Gibbons et al., 1994; Etzkowitz and Leydesdorff, 2000; Voß and Bornemann, 2011; Carayannis et al., 2012). Moreover, by the very nature of conducting research in a field labelled sustainability is to also understand the challenge of generating "actionable knowledge", that is, findings informed by

non-academic stakeholders with a view to ameliorating, improving, or resolving current socio-environmental problems and crises.

It is in this context that transformation emerges as an antidote to the production-consumption treadmill of the global economic system and speaks of structural, qualitative change. In relation to, say, the effort required in the context of climate change mitigation involving the wholesale replacement of a fossil-fuel-driven energy regime by a low-carbon alternative system then, at one level, we can see that this involves a deep process of socio-technical transition. However, we might ask whether this in itself constitutes transformative change if end user practices remain as before with little engagement with the governance of such new arrangements. Switching from fossil fuels to nuclear for energy provision or supplementing fossil fuels with renewables hardly encompasses the necessary qualitative transformational change necessary in the context of a growth-fuelled, consumption-driven society (of material, energy, and data). The development of new data centres in the Republic of Ireland, for example, has the potential to add over 40% to energy demand from 2028 (Eirgrid/SONI, 2018), from a base whereby they drew on less than 6% of energy demand just over a decade earlier in 2015 (Coyne and Denny, 2018). On the other hand, transformation might arguably have occurred where energy supply was now largely provided by distributed small-scale, community-owned generation schemes and where demand was in line with the availability of local resources.

Our understanding of transformation consequently reflects a preoccupation with the need to secure effective, equitable (i.e. socially just) and durable solutions to our global environmental predicament, one that represents qualitative change in the human experience. This means that technical innovations, though vital, are but just one part of a complex set of inter-connected changes and where the biggest challenge of all is likely to involve a re-calibration – a re-boot if you will – of the popular imagination: human hearts and minds. This is where metaphor, myth, and fable have such a vital role to play.

For example, as Tim Jackson reminds us, the metaphor of Adam Smith's "invisible hand" has proven extraordinarily powerful and has been central to modern economics. As Jackson argues, "this one single metaphor has motivated a ferocious defence of the virtues of an unbridled 'free market' in which self-interest is given full rein". (Jackson, 2016: 132). Economics subsequently served to conflate self-interest with human nature but as Jackson argues, there is plenty of evidence of altruism and this was fundamental to our evolution as social beings. While there is evidence for individualism and novelty-seeking in human adaptation, so there is also for altruism and conservation. Indeed, contra Dawkins' metaphor of the selfish gene, Ulanowicz, informed by his work on ecosystem networks would forcefully contend that in the natural world symbiosis and mutuality comes before and below competition (not the other way around, as is evidenced by autocatalysis, the centripetal action that underpins ecosystems; indeed, competition only emerges when there is a scarcity of resources) (Ulanowicz, 2009: 73–76). Larson too (2011: 83–88) reflects on this traditional bias in science and ecology towards competitive instincts in nature over mutualism, while citing the possibility of individual and cultural contexts in such scenarios, including the

dominance of male researchers (Keddy, 1989). However, the prevailing social paradigm of consumerism privileges and encourages selfish individualism and its success in embedding personal hedonism has served to jeopardise conditions for a shared prosperity.

Challenging the primacy of such economic metaphors as the "invisible hand" of the market as well as a whole array of mainstream economic "sacred cows" has long been a struggle for those who fall under the umbrella of heterodox economics. Sharing a rejection of the neoclassical "homo economicus" model of individual behaviour (rooted in self-interest) heterodox approaches, while highly diverse in philosophy and method, share an appreciation of institutions, social structures, and evolutionary change. While this is not the place to embark upon a detailed disaggregation of this highly pluralist turn in economics, it is necessary to recognise that the metaphors of the economic incumbency are being challenged by new concepts, theories, and metaphors from those who recognise the need for transformation. While this might once have referred only to Marxist economics, there is now established fields of innovative thinking taking place across the fields of feminist, environmental, and ecological economics with many other currents besides. What this has helped to do is to establish critical mass and momentum in cross-disciplinary dialogues that are challenging the dominant metaphors, such that notions of "degrowth", surely regarded as blasphemy in mainstream economics, has become a "hot topic" in sustainability circles (D'Alisa et al., 2015; Kallis and Vansintjan, 2018).

One brief example here to illustrate the degree to which transformation will require a fundamental rethink of human agency in the world can be garnered from a consideration of the emergence of contemplative social science. This may seem not only a world away from conducting an "objective analysis" of our current predicament, but an abnegation of responsibility by promoting an inward – rather than outward – perspective. However, if we are serious about transformation then we must break once and for all the "homo economicus" model that drives hedonistic consumption and find a way of (re-)connecting ourselves to the natural world. Never has there been such an important moment to undertake such a change of direction – and not solely due to our environmental crisis. As two of the chapters in this book explore, our current global food system is both deeply unsustainable and creating environmental and human catastrophe. Many western societies appear to be beset by a rising epidemic of mental health problems, the causes of which are obviously complex and deep-seated, but which are starkly manifest in numbers of suicides. The crisis of dementia, also explored in a later chapter, illustrates the unsustainabililty of our dominant model of caring (or un-caring). Is there evidence to suggest that consumer culture plays its part? The market appears unrelenting in its capacity to offer tantalising novelties for our enjoyment: if only we had the means to pay for them. More worryingly, young people are under enormous pressure to conform to contemporary standards of appearance and beauty that are pushed through social media by corporate interests fronted by glamorous representatives and brand ambassadors such as the Kardashians. An always-on mode of ever-increasing consumption of material, energy, and data (e.g. through social media and via smart society) increasingly

pervades, feeding into a throwaway consumptive culture. Unsurprisingly, health professionals are urgently exploring solutions to this predicament and one measure that has come into popular public view is that of mindfulness (Kabat-Zinn, 2004). We wonder if this, or what is more widely termed as contemplation, an ethic which recognises a need to go beyond consumptive materialism, is perhaps foundational to achieving authentic transformation. A challenge, then, is how this can be brought into the realm of policy making, replacing negative economic incentives and their associated mental states with positive inducements that stimulate sustainable economic mindsets and behaviour.

The legacy of enlightenment philosophy rooted in the separation of humans from nature, such that we could better objectify and thereby measure the Earth and its life forms, remains a persistent influence even within contemporary sustainability science. This gives rise to the formulation of technical solutions to our environmental crisis without ever truly grappling with the underlying mindsets (beliefs, values, attitudes), and their systemic structures and behavioural patterns which they underpin. A relational epistemology, in contrast, begins from recognising subjectivity across all forms of life – human and non-human – which are increasingly visibly entangled. If we are to take steps to reduce our impact upon the Earth and all its species, then perhaps we need to find ways to move beyond narrowly scientific understandings of cause and effect and draw upon a moral code of practice rooted in compassion and empathy. Arguably it is only by being open to the vulnerability and suffering of the poorest, least responsible victims of climate change that will enable us to appreciate the embodied responsibility of hyper-consumerism in the West and the urgent need to address levels of consumption. In this regard, the need for a new language through which to mobilise a collective enlightenment is truly pressing (Wamsler, 2018; Walsh, 2018a, 2018b).

Overview of chapters

Metaphors of reason

Technologies associated with energy have had some of the most significant environmental impacts with the most alarming consequence of carbon-based energy technologies being climate breakdown. In his chapter, Fionn Rogan is concerned about the way in which metaphors used to describe technological change can often divert attention from the detrimental consequences that such change can bring about. His chapter examines four key metaphors of technological change – technological fix, technological determinism, technological dialogue, and technological momentum – and assesses how these metaphors can bring attention to, or shift attention away from, the unintended consequences of new technologies. The metaphor of technological fix, for example, gives primacy to technology as the decisive factor in the solution of society's problems. It implies that technologies are distinct from, rather than embedded within, broader society. The metaphor of technological fix, Rogan argues, is likely to fuel techno-optimism and divert attention away from the wider societal consequences of technology. Other metaphors of technological change, by contrast, such as the metaphor of

technological momentum, better reflect the social embeddedness of technological change. The impact of a new technology can begin slowly and acquire momentum as complex social and technological dynamics lead to the widespread adoption of the technology, often accompanied by profound social changes. The metaphor of technological momentum therefore situates technologies not as single discrete artefacts, but as parts of interconnected complex systems. According to Rogan, this metaphor better reflects the complexity of socio-technological change and allows for a deeper engagement with the potential unintended consequences that new technologies invariably bring. The metaphor of technological momentum also opens up the debate on technology to wider non-specialist audiences who may be profoundly impacted by technological change.

Colin Sage draws attention to the fact that climate breakdown is just one of the many unintended consequences that technologies and their accompanying social practices are having on our environment. The metaphor of planetary boundaries, as set out by Rockström et al. (2009a, 2009b) and by Steffen et al. (2015), identifies nine key Earth system processes, each of which are being affected by human activity. These nine planetary boundaries delimit the space which must not be breached if we are to maintain Earth as a safe habitat for humanity. For three of the nine processes however – climate change, biodiversity loss, and nitrogen and phosphorous flows – we are already breaching these boundaries.

In his chapter on the Global Food System, Planetary Boundaries and the Metabolic Rift, Sage concentrates on one of these breached boundaries, namely the global biogeochemical flow of nitrogen. Although not as widely acknowledged as the challenge of climate change, the disruption of the global nitrogen cycle by human activity is a serious environmental challenge facing humanity. While climate breakdown can be understood as an unintended consequence of energy technologies, the disruption of the global nitrogen cycle is largely an unintended consequence of agricultural technologies, in particular the development and widespread use of nitrogen-based fertilisers. As Sage explains, the development of the Haber-Bosch process early in the twentieth century to synthesise atmospheric nitrogen (N_2) into the form of fertiliser has had a transformative effect on both population growth and on humanity's ability to feed itself. The astonishing impact of nitrogen-based fertiliser can be seen from the fact that nitrogen fertilisers are responsible for feeding almost half of the world's population today (Erisman et al., 2008).

The large-scale use of nitrogen fertilisers, however, is also having a transformative effect on the global nitrogen cycle (Galloway et al., 2002). The detrimental consequences of this are becoming ever more apparent in the form of nitrate leaching into groundwater, a loss of terrestrial and marine biodiversity, agricultural emissions of ammonia that create toxic air quality, and contributions to climate change through N_2O, a potent greenhouse gas. Sage explores these multiple destructive impacts using the metaphor of the metabolic rift, a metaphor that highlights the disturbed metabolic interaction between human society and the environment under the current global agri-food system.

In the chapter "Defamiliarisation of Food", Shane Crowley stays with the global agri-food system by exploring how contemporary metaphors mediate our

relationship with food. That everyday language is rich with food metaphors – food for thought, an unsavoury character, half-baked plans, a bitter taste in our mouth – is not surprising, given the centrality of food in our lives. Such examples indicate that food as a signifier is involved in the transmission of meanings far beyond its immediate function of ensuring human survival (Stajcic, 2013). Cooking, for example, is a means by which raw food (nature) can be transformed, following Levi-Strauss, into culture, and traditional dishes form the basis of cuisine as part of a cultural identity which can be shared.

Metaphors concerning food influence how we view ourselves as individuals and as societies. Metaphors of food are also closely linked to metaphors of the body. The metaphor of food as fuel, for example, is connected to the metaphor of the body as a machine. As Crowley outlines, today's metaphors increasingly compare the human body to a computer, with food as a bug in the system. Food metaphors are moving towards a narrative in which food functions solely as a vehicle for energy and nutrients, a reductionist philosophy that views both food preparation and the body to be problematic aspects of life (Miles and Smith, 2016). Crowley takes this development further using the vision of the cyborg – future humans as hybrids of organism and machine – and sees contemporary developments such as smart foods and meal replacement nutritional drinks and pills as steps that will eventually enable the transcending of bodily limitations altogether. However, he points out that many of the techno-utopian metaphors that suffuse contemporary discourse on food and diet are in direct tension with a lived experience of food that spans cultural and social domains. Can traditional food, the ill-disciplined pursuit of which is linked to disease and waste, survive future developments in food technology? Ultimately, Crowley concludes, food scientists and engineers are not only manipulating organic matter but also metaphor, giving themselves considerable power to shape future conceptions of food, the body, and the social world.

In the final chapter in this section on metaphors of science and reason, James Glynn returns to the challenge of climate breakdown by discussing the metaphor of carbon budgets. Carbon budgets give a meaningful and simple method to understand and communicate the scale of action required if we are to limit the dangers of climate change. Global temperature increase is driven by the cumulative greenhouse gas emissions from the combustion of fossil fuels, emissions from industry, and land use change for agricultural purposes. The remaining cumulative carbon dioxide emissions that would result in a 1.5°C or 2°C temperature increase with a given probability is referred to as a Carbon Budget.

If we are to limit future warming to 2°C with a high probability, we can only emit around 1 trillion tonnes more of CO_2 into the atmosphere; that is, we have a remaining carbon budget of 1 trillion tonnes of CO_2. To limit warming to well below 2°C and towards 1.5°C, as is the goal of the Paris Agreement, we can only emit between 200 Gt CO_2 and 700 Gt CO_2, so our remaining carbon budget is much lower. For comparison, global CO_2 emissions in 2017 were estimated to be 41 Gt CO_2 and are rising.

As Glynn explores, the metaphor of a carbon budget succinctly communicates a number of vital messages about climate change. First, that long-term

temperature rise does not depend on CO_2 emissions at a specific time, but on the cumulative emissions that have been made, largely since the beginning of the Industrial Revolution. Second, that our current CO_2 emissions are critically important as they are exhausting our remaining carbon budget. Third, that CO_2 emissions will need to be phased out to net zero eventually in order to achieve global temperature stabilisation.

The chapter also explores how the metaphor of carbon budgets is being used as an instrument of equitable climate action. For example, because they industrialised earlier, the wealthier countries of the world, western Europe, Canada, Japan, and the USA, have produced considerably more CO_2 than their fair share carbon budget. It can be reasonably argued, therefore, that these countries should enable developing countries to decarbonise by providing financial aid, access to financial capital, knowledge transfer, and technology transfer (CSO Equity Review, 2018). The utility of the powerful metaphor of carbon budgets to issues of equity and responsibility also extends to sub-national and individual levels, as Glynn also explores.

Myths and metaphors of unreason

In this first chapter of the second section, Edmond Byrne poses the fundamental proposition that the challenges of unsustainability will require much more than technological change. They require a reorientation in our current conception of reality, and for such a reorientation to occur, changes in the metaphors that reflect our view of reality are also urgently needed.

Our current dominant paradigm, which has been incredibly successful over the past four centuries, inspired by neo-Cartesian rationality, is one characterised by antagonistic dualism seeking reduction, separation, control, and certainty, and which now transcends all of our globalised societies. The challenges of sustainability, however, Byrne argues, require a radical shift from such monopolistic thinking towards a complementary view of reality characterised by the metaphor of agonistic dualism, whereby polar opposite tendencies are seen as mutually obligatory. Such a metaphor has been used across many human cultures throughout history, most prominently in Eastern traditions such as Taoism and Zen Buddhism which espouse the complementary opposites of Yin and Yang.

Byrne's chapter reflects on parallels between the metaphor of agonistic dualism and the physical make-up of the brain and its two hemispheres, as elaborated in the work of neuropsychiatrist Ian McGilchrist (2009). McGilchrist describes the two asymmetrically different though complementary cerebral components: with the left hemisphere taking a literalist, rationalist, explicit, decontextualised, and "either/or" approach to the world around it; while the right hemisphere takes an integrative (facilitating "both/and") approach, while seeking both context and (inter)connection.

The chapter argues that metaphor – together with narrative, story, and myth, as well as other right hemisphere constructs such as art and music – are really the only means of sufficiently moving individuals, communities, and societies to embark upon the type of transformational change that is required to achieve

authentic sustainability. Byrne explores, in particular, how metaphors of "sustainability as flourishing" and "nature as sacred" might radically reorient our collective worldview as a precondition to bringing about the fundamental changes in our lifestyles and behaviours that sustainability challenges demand.

In the chapter "Myth beyond Metaphor: Myths in Transition", Evan James Boyle builds on Byrne's thesis by arguing that myth has largely been extinguished from modernity as a means of sense making. While myths previously established social customs and moral lessons, with modernity they came to be a representation of irrationality, unable to stand up to scientific reasoning. Quoting Nietzsche in The Birth of Tragedy, Boyle argues that "Man today, stripped of myth, stands famished among all his pasts and must dig frantically for roots". The directionality provided by myth, however, is necessary if we are to navigate the challenges of sustainability.

Modernity, Boyle argues, does have one dominant surviving negative myth in the form of Goethe's Faust. In Goethe's tale, the protagonist signs a blood oath with Mephistopheles, to gain all knowledge and power during his life in return for his soul in death. The contemporary citizen, hypnotised by technological acceleration and the commodification of social life, like Faust, has sold her/his soul in return for material progress. The contemporary absence of positive myth, however, mitigates against what complexity biologist Stuart Kauffman terms an emerging "global ethic" (Kauffman, 2010). According to Kauffman, we lack a transnational mythic value structure that can expand our consciousness and sustain our emerging global civilization.

But rebuilding a new mythology to sustain and accelerate our transition towards such an ethical globalised future is not a simple task. Hyman (1955) goes as far as to suggest that no one can invent myths. Instead mythology is a pantheon, a cumulative creation, borne out of many generations (Schorer, 1960). The creation of a new pantheon of myths, Boyle argues, requires revisiting the myths of old to seek guidance. In suggesting a beginning to such a Herculean task, Boyle suggests the myth of Oedipus as one candidate for mythic revival. In consulting the Oracle at Delphi, Oedipus was informed that he would kill his father and marry his mother. Taking the maternal to represent the earth, or "mother nature", we are faced with a quandary not dissimilar to the one faced by Oedipus in having to choose what aspects of the father (masculinity, dominance, control) we must leave behind if we are to accept that our fate is married to that of mother Earth.

Fables have been used for centuries to relay important messages in a playful manner. In the fable of the hare and the tortoise, the tortoise declares that he will beat the boastful hare in a race. As the fable recounts, the complacent hare wakes from a nap just in time to see the tortoise crossing the finish line. "Slow and steady wins the race" is the moral of the story. Yet in terms of pressing contemporary issues around sustainability, "slow and steady wins the race" appears paradoxical in the context of the often-panicked sense of urgency being expressed by those intimately involved in the area. In their chapter, McGookin, Ó Gallachóir, and Byrne explore a number of narratives around issues of sustainability, in particular concerning climate change, by casting the hare and tortoise in a variety of roles. With the hare in the role of radical environmentalists, experts in climate science

who have raced ahead and seen the coming catastrophe, and entrepreneurs marketing new technologies they are convinced will solve the problem, the chapter presents a series of narratives that argue that there is value to the tortoise's "slow and steady" approach. While innovative individuals, be they activists, scientists, or inventors, are necessary to disrupt societal structures and begin the proverbial race to sustainability, only through a widespread change in beliefs and values in wider society (represented by the tortoise) can the race be won. And while there is urgent need for transformative and dramatic change to the course of our civilisation, we must be careful to ensure that the changes we are making do not have unintended consequences highlighted in earlier chapters.

In their final narrative, the authors present the hare as neoliberal society racing relentlessly on in pursuit of economic growth and material accumulation though eventually to be overtaken by an as-yet emerging society based on more collective and sustainable values. The hare, which appears to be making most progress, has principal concern around personal attainment and material possessions, though accepts the high and rising costs of unsustainability. The more purposeful (and ultimately wiser) tortoise, by contrast, can see a greater value in restraining its personal desire for consumption and seeks instead to flourish through interpersonal connections. If the tortoise wins this race, we will have constructed a global society whose priorities lie in achieving harmony between itself and its environment.

Metaphor, myth, and mind

In the opening chapter of this section concerned with aspects of human consciousness, Ian Hughes explores how metaphors in psychoanalysis can contribute to our understanding of how we might achieve the necessary changes in relationships towards greater empathy and equity, required for transition to sustainability. The chapter explores the psychoanalytic concept of development and the myths and metaphors that are used therein.

Hughes explores two myths that are foundational in psychoanalysis, namely the myth of Narcissus and the myth of Oedipus, which capture the two primary psychic challenges every child must face during the first years of life. The child's first challenge is to overcome its infantile state of primary narcissism and accept the reality that they are not the sum total of existence, a realisation brought on by the gradual withdrawal of the intensity of care provided by the child's parents in the first few weeks and months of life. If negotiated successfully, the child establishes an internal capacity for the containment of emotion and an internalisation of the world as a benign and supportive place. If this crucial initial stage of psychic development is not negotiated successfully, the child, like Narcissus, is at risk of remaining in an infantile state characterised by concern for self-preservation, paranoia, and an ability to only love itself. The infant's second major psychic challenge follows on quickly, as the child realises that not only is it not omnipotent, but that it must also share the world with many other people who have wishes of their own. For Freud, the myth of Oedipus encapsulated the child's primitive wishes to deny the dawning reality that he is not the sole focus

of his mother's love, and the powerful feelings of envy and rage that accompany the infant's recognition of this painful fact.

The myths of Oedipus and Narcissus, Hughes argues, and humanity's collective failure to deal successfully with the challenges of early psychic development, are reflected in the dominant zeitgeist of contemporary society. This zeitgeist is characterised by humanity's grandiose sense of self-importance and uniqueness; our exhibitionistic need for constant attention and admiration; our lack of empathy and disregard for rights of future generations and other species; and relationships with one another (and with nature) marked by a sense of entitlement and exploitation.

In his chapter, Cormac Sheehan shifts our attention towards another growing challenge for societies around the world, namely increases in the prevalence of dementia. In 2015, it was estimated that dementia affected 45 million people. By 2050, this is set to rise to 131 million, with the largest increases predicted in low- to middle income countries, due both to ageing populations and improvement in diagnosis and awareness. Sheehan explores metaphors of dementia and how such metaphors can either increase or alleviate suffering. His point of departure is Sontag's seminal work "Illness as Metaphor and AIDS and Its Metaphors" (Sontag, 2009). Sontag wrote (metaphorically) that when we are born, we "hold dual citizenship in the kingdom of the well and in the kingdom of the sick" and that, on becoming sick, we take up citizenship in that "other place". Sontag criticised the, often malicious, metaphors of illness and argued that we must understand illness metaphors in order to be liberated from them.

In this chapter, Sheehan describes how metaphors of decline and decay, of war, flood and epidemics are common in discourses about dementia. Terms like "dissolution" and "unbecoming of the self" are commonly found, along with descriptions of dementia as an "extinction of personhood" and a death-in-life or living death. The metaphor of "losing one's mind", which is associated with culturally constructed notions of personhood, even raises questions about a person's eligibility for moral membership of the human social environment (Johnstone, 2011: 382). In response, Sheehan counters that while the dominant metaphors may deem a person to be within a "living death", those close to the affected person actively challenge such an imposition. Carers do not allow the physical appearance of a person with dementia – their hair, clothes, and cleanliness – to become unkempt. This care for the body is the antithesis of social death. A shift in social attitudes in recent years is discernible as a host of films, plays, and novels explore the human side of dementia. However, if we are to be further liberated from the current pantheon of illness metaphors, Sheehan argues, new more imaginative and more humane metaphors are urgently needed.

Dreams, visions, revelations, oracles, and prophecies have shaped societal, cultural, and religious changes throughout the history of humankind. Dreams are imaginative, relying on other worldly visualisations and images of the world. Dreams question, represent, or sustain the world and they have the power to transform. Consequently if, as earlier chapters have argued, a fundamental reorientation of our current dominant view of reality is integral to the transition to sustainability, then there may be much to learn from understanding other

eco-cosmological worldviews. In "The Dream as Metaphor of Transformative Change", Lidia Guzy explores the Shamanic dream to provide an insight into the radically different worldviews of some indigenous cultures. Throughout history, indigenous peoples have been marked by marginalisation, colonisation, and by the general devaluation of their knowledge systems. As a result, indigenous explanations appear largely "meaningless for the modern world" (Brabec de Mori, 2016: 80–81).

As Guzy outlines, eco-cosmologies are worldviews relating the human with the non-human, the cosmos and the other-than-human sphere such as trees, animals, rivers, mountains, and spirits. An important element is the absence of the dualistic separation between the human and the surrounding geography and landscape, such as a mountain, a river, or a tree. "Identity" is not ego or body centred but is spread and integrated with the surrounding ecology, geography, and territory. In a cultural practice that spans from Siberia to the Amazon, the shaman in this eco-cosmological setting is the local intellectual and spiritual leader with the capacity to transcend different dimensions of existence through the shamanic dream and its ritual communication. The shamanic dream marks a different form of knowledge system that does not anthropomorphise everything by explaining all existence in terms that are relevant to humans. Indigenous peoples are also deeply aware of the fact, only recently acknowledged by science, that every aspect of their forested territory has been transformed by their ancestors – that their primal home is not "wild" but has been human-influenced according to the ethno-agricultural and ethno-biological knowledge of these hunter gatherer societies. The shamanic dream, reflecting humanity's deep interconnection with ancestors and environment, past and future, can be read as a fundamental dismissal of global anthropocentrism, modernity, and materialism.

Metaphors of creativity and practice

Kieran Keohane begins his chapter, Joyce's Arches, with the assertion that the methods and mind-sets of Modernity are fully implicated in the malaises of our times: from existential threats of climate breakdown and species extinction to the insidious and pervasive dissolution of traditions, values, and ideals that are essential to well-being and human flourishing. In our time which demands renewal, Keohane turns to James Joyce for a rich source of metaphors that create spaces of ambiguities and ambivalences, paradoxes and dialectical antitheses, and which open up new possibilities for imagining future horizons. Keohane agrees with Byrne's assertion in his earlier chapter that our current crises of sustainability require metanoia – a change in the trend and action of the whole inner nature, intellectual, affectional, and moral; a transmutation of consciousness; a conversion.

The chapter describes how specific objects and artefacts for Joyce held the prospect of enabling transition, metanoia, transfiguration, and transformation. The ancient Roman arches that Joyce knew well when he lived in Pula, Trieste, and Rome were, for him, objects that in his imagination could connect disparate times and places. The Arch of Constantine, for example, was for Joyce over-determined

and ambiguous, standing in a thoroughfare in ancient Rome while simultaneously having all of modern humanity flow through it, while reminding him of his good friend Constantine Curran and the city of Dublin. Joyce's arches had the effect, by enabling this mind shifting through multiple perspectives of reality, of transformation. As Keohane describes, Joyce intended Ulysses and Finnegan's Wake, with their over-determinations, portmanteaus, and metaphors, to have just such effects. Joyce was concerned with how modern people generally suffer from conventional morality, solipsism and inept maladaptation to the demands of changing cultural, political, psychological, and moral contexts, and that this willing conformity to the flow of prevailing discourse, an inability and unwillingness to turn around is one of the pathogenic social currents of our time. His writing was intended as a portal, a transformational object, which once encountered or passed through, would awaken the reader to a new perspective on reality and a renewed resilience to sustain civilization through a contemporary Dark Age, such as the late-modern antediluvian eve of the Anthropocene.

Maureen O'Connor's chapter draws attention to the role of the ecological humanities in seeking to destabilise conventional notions of subjectivity. Here she argues against the idea of independent entities that forms the basis of a separation between the human and the nonhuman and which has proven so disastrous for the environment and the planet's inhabitants. In her chapter, O'Connor challenges the metaphor of the mirror that science has claimed it holds up to reality, establishing and perpetuating the idea of objective, scientific "truth" regarding the natural world and natural phenomena. In its place, an alternative dynamic metaphor of diffraction, first proposed by Donna Haraway (1992), is explored for the relationship between the observing human consciousness and the finally unknowable world around. The metaphor of diffraction suggests a different approach to understanding physical phenomena, one that accepts the incomplete nature of human knowledge, that recognises and even embraces the unstable, the plural, and the partial.

The 2016 prize-winning novel, Solar Bones, by Irish writer Mike McCormack, which is the focus of the chapter, not only directly addresses the ecological destruction brought about by late capitalism in twenty-first century Ireland, but also, in the text's innovative form, enacts the crisis through a diffractive aesthetics of fragmentation and heterogeneity that reveals unsuspected but vital continuities and connections. The text's narrative form evokes a decentralising and disassembling view of reality and experience while simultaneously painting a picture of a universe in which everything is deeply interconnected. The "luminous bones" of the title refer, inter alia, to sections of a disassembled wind turbine, a symbol to the narrator, Marcus, of a failure of imagination, "the world forfeiting one of its better ideas", defeat in the struggle to imagine a new and better world.

The text, which is haunted by James Joyce, ranges over themes of ghosts, death, illness, and mechanical and societal breakdown. It laments an imagined better world but one not brought to fulfilment and, by radically disturbing our engagement with the world, holds out the possibility of a more ethical response, more accepting of the partial and fragmented, than the patriarchal model of omniscience and control.

At the beginning of her chapter, Jools Gilson asserts that metaphor and creative writing, dance, theatre, music, film, visual art practices (as well as multiple combinations of these) contribute blue sky/outside of the box thinking, and that if we want to retain our blue sky and not end up in boxes, we need the world-making intelligences of creative practices. The chapter proposes that creative practice disciplines have a powerful and critical role to play in collaborative research models for sustainability. These are knowledges, Gilson argues, which challenge the hegemony of critical analytical modes of meaning-production. They engage with the world differently than many academic disciplines, are fluent at embodiment, affect, visual literacy, imagination, and engaging with communities.

Using rain and water as the primary metaphor, Gilson demonstrates the power of creative practice disciplines by describing a series of artistic installations. Gilson draws upon the writings of writer and theologian John Hull which recounts his journey into blindness. Hull, after being deeply moved by the sound of rain outdoors, makes the wish, "If only there could be something equivalent to rain falling inside, then the whole of a room would take on shape and dimension". Film makers Peter Middleton and James Spinney (Middleton and Spinney, 2016) make John Hull's dream of an internal raining, literal: as he sits quietly at his kitchen table before a teacup, the panning camera and sound pick out distinctly the sound of rain as it falls on its delicate china surfaces. Like a bat's sonar, the sound of rain and its complexity of different tones, cadences, and rivulets allow Hull to see once again, but in a radically different manner.

In the chapter, Gilson also describes her own art works, in what she calls a drenching lineage, the most recent of which is The Rain Box (Adams and Gilson, 2017), a playful piece of radio that explores the science and poetry of rain through the tale of a child who finds a hidden box with rain falling inside. As Gilson describes it, The Rain Box is a whole folklore of rainy tales, of a people who sing the rain out of the sky, who weep when it rains, who mark in its spaces all species of yearning. In Gilson's work, Ireland itself, and the wider world too, is presented as a box of rain that holds stories suffused with meanings and metaphors that hold the potential to create a brighter future.

Conclusion: Language as catalyst for sustainable, transformative change

The respective chapters of this book possess a genesis which in itself indicates more than a disparate collection of myth-infused and metaphor-imbued offerings from across a range of disciplines. Each chapter is derived from the authors' commonly fermented understanding of the meaning, power, and value of language, in particular, how humans interact with each other through metaphor and myth in the process of societal development and change. Secondly, the book represents offerings from a collective which considers that such societal change and development should be, and indeed in our current phase of societal development, must be, strongly and rapidly directed towards "sustainability", and

by that meaning something which is more akin to environmental and societal flourishing, rather than narrowly and technologically focussed on, for example, atmospheric carbon reduction. Thirdly, each of us would strongly profess that such an enormously ambitious aspiration can only be achieved when science and the humanities are driven by a transdisciplinary ethos. Indeed, recognition of the centrality of metaphor (and its offspring – myth, narrative, and story) necessarily posits the humanities and social sciences as front and centre in any quest for such a sustainable society and environment. Clearly, such positioning effectively removes any illusions of a "one-eyed" reductionist scientism, associated narrow "mode 1" conceptions of science or the holy grail of a prevailing techno-optimistic "science" which possesses the "solutions" which only need to be uncovered. Nor does it relegate the humanities and social sciences to a role whereby they are accorded a neat window-dressing role to speak for "society". For, as we hope this book makes clear, science is both built and communicated through metaphor, and the stories that it offers are as politically and ideologically present in its disciplines, including above all the metaphor (the myth?) of the "objective observer", which is central to the scientific method. The great advantage that humans possess over other species (we believe) is the self-aware consciousness that makes us beings of stories, narratives, and metaphor – and all categories of scientific and technological advance, as well as societal progress, depend on this fact.

It is within this context, and on this explicitly recognised more level playing field that the authors have engaged in this particular project and its associated (and ongoing) dialogue. A generous spirit of "disciplinary humility" (Tripp and Shortlidge, 2019) ensconced within enquiring scholarship therefore both brought us together and informed our work as we proceeded through the preparation and presentation of draft chapters and a willingness to revise in response to review and critique. This ongoing and constructive conversation, informed by a strong sense of trust in each other's motives, enabled and encouraged us to seek value within and across each other's disciplinary perspectives. Far from diminishing our individual disciplinary integrity, we have found added value from widening the lens and bringing new perspectives back into our "home" disciplines.

It is through this ongoing, inclusive and transdisciplinary spirit that we have forged this work. As with our earlier publication, "Transdisciplinary Perspectives on Transitions to Sustainability" (Byrne, Mullally and Sage, 2017), the current book arises from an initial gathering that sought to widen the conversation within the academy; this time drawing in the arts and humanities as well as medicine. While each of us – as editors and contributors – are deeply motivated by the question of sustainability, we are equally driven by the question of transdisciplinary practice and knowledge. On this occasion, however, the notion of metaphor served as an entry point – or boundary object – that allowed for communication across disciplinary silos. For metaphors and myths have a universal power capable of helping us collectively to achieve the scale of transformative change necessary to inflect us from the course of global ecological catastrophe and towards societal and environmental flourishing.

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